HOW CONGRESS DEALS WITH SCIENCE AND TECHNOLOGY

EMILIO Q. DADDARIO*
Congressman from Connecticut
U. S. House of Representatives

It is a privilege to be asked to tell you how Congress deals with science and technology. As a native of Boston, and a New Englander, I am deeply conscious of the skills and abilities which our area has to offer the Nation, as proven by its role in history, and I am a confirmed believer in its share of the future. I am aware also of the way in which the many applications of science have changed and revivified New England. We all recall the vacuum created when some of our industries moved away, and the struggle to fill that void. I can appreciate your great pride in the strength of New England today without detracting from the fact that much more needs to be done.

First, let us agree on definitions. When I speak of science, I mean the knowledge of physical laws and the natural laws which enables us to assemble all things that should be known in advance of initiating a course of action. Science is, of course, drawn from the Latin word meaning to know. The definition which I have used to refer to knowledge before initiating a course of action is, in fact, the Hoover Commission's definition of intelligence. When we talk about Congress dealing with science and technology we do not refer to a direct encounter. Science is not a subject like agriculture, communications, or transportation, which could be met as a single subject. It appears in most national programs and falls within the scope of many committees.

In its daily work, Congress makes many decisions which affect the course we shall take in seeking to attain our national goals. Most important, we are charged by the Constitution with the allocation of national resources in support of such effort. It is critical that we draw together all our country's resources when we have determined an essential course, and assign them wisely. While management in itself is customarily an executive responsibility, it does not relieve the Congress of the responsibility to review and adjust such action.

The problem which I am discussing has occurred through the remarkable growth of science in this century. Knowledge develops knowledge. It also requires the application of more people and more money to carry on the search for new knowledge. Before World War II, only $300 million a year was spent for research and development in the United States, including Government laboratories and civilian institutions. This year, the Congress has been asked to consider a budget which provides $15.3 billion for research authorized by the Government alone.

The critical importance of the wise use of science in our national future was amply demonstrated by World War II. With its end came the resolve to make better use of science in the ensuing years. Creation of the National Science Foundation was one action intended to further that aim. But as science has been growing and finding new outlets in national policy, the less flexible forms of organization have not always kept pace. Academic organizational patterns have not always adapted to these new issues rapidly. The physical and biological science departments are still very much a part of many colleges of arts and sciences, but the merger and overlap of these fields of knowledge, the sharp need for a recognition of greater study in interdisciplinary fields, has not been met.

Beginning some years ago, the executive branch of the Government made an approach to better organization of science in its work. The President was provided a special assistant for science and technology,

*Chairman, House Subcommittee on Science, Research, and Development.

and the first three times they sought to fill this post, they turned to Boston for expert help.

And now we come to the Congress. The procedures which are followed in the House of Representatives and in the Senate have been developed over many years, and have served the Nation well. They provide for delegation of proposals to the respective committees, the careful and thorough assembly of information which the committee believes pertinent to the subject, study and review, and then recommendations to the full chambers for action.

In this century, subjects of growing complexity have been made the subject of congressional study. Atomic energy is a case in point, and the Joint Committee on Atomic Energy has done a commendable job of dealing with proposals in this area. Many of these proposals involve policy rather than science, and require balance against differing and competing factors before a decision can be made. This is the function which has been the role of Congress over our history.

In recognizing the increase in importance of science, however, it is fair to ask what we have, in a sense, criticized in the universities. Has this importance and its expansion been recognized in more flexible organizational patterns? In all honesty, it cannot be said that the structural lines of the Congress necessarily make for the full use of scientific information. In the mid-fifties, the space program and the possibility of the exploration of space presented a new challenge to the United States. This question was thoroughly reviewed by select committees under the leadership of our present Speaker, John W. McCormack, and our President, Lyndon B. Johnson. We met the challenge by establishing a science committee. The space program which has come under the jurisdiction of that committee has been responsible for one of the most dynamic programs in support of science that the government could have undertaken, but the process of review to see how best it may be used in the national interest goes on.

There have been a great many suggestions about how Congress might strengthen its own sources of information and advice on scientific and technical fields. Our feeling is that it can best be done through the standing committees that now discharge responsibilities in the areas of national affairs and must consider scientific evidence. The membership of staffs for these committees may be strengthened. Temporary consultants may be used, where really technical matters are involved, for whatever period of time is necessary. A mechanism for building up scientific assistance already exists in the Legislative Reference Service of the Library of Congress. It is only common sense that this area can and should be strengthened. Closer liaison with professional societies and industrial organizations has been and is being obtained by our subcommittee and is a fruitful source through which the talents of skilled people may be brought to bear in the mission of Congress.

Our subcommittee has already noted that strong and steady programs of review in highly complex areas are being carried on by standing legislative committees. The Joint Committee on Atomic Energy, the Committee on Interstate and Foreign Commerce in dealing with communications and transportation, and the Committee on Armed Services reviewing changing concepts of weapons, all require and make use of scientific advice. It is important to achieve better liaison among the committees to make the most efficient use of such advice, and to improve channels between Senate and House committees which work on the same problems.

On the science committee, we have created a subcommittee which I chair. This subcommittee has been given the responsibility of exploring the issues raised by scientific research and development across the entire spectrum of the Government.

We began our studies by reference to the full committee's special panel on science and technology, asking the views of the members of this group on the most important questions that affect government and science. Then we began public hearings on the relationship of Federal scientific programs to our national capabilities. Witnesses included many of the Nation's most prominent scientists. From that information, once digested, we have identified major trouble spots in the Government—science relationship, some of the opportunities which exist, and some of the areas which need further study.

Meanwhile, we began publication of essential data for our work. We published a statement of purpose which described a number of technological and social issues as they appear to be crystallizing today. The second report reviewed trends of Federal spending on scientific projects and research. Now in preparation is a preliminary survey of the recently emerged issue of adequate congressional information and advice.

We also approached qualified sources of advice to be of assistance. We have concluded an agreement

with the National Academy of Sciences, the distinguished century-old body of American scientists which, as the late President Kennedy once remarked, through the range and depth of its members, is the seedbed of our Nation's future. We have arranged with the National Science Foundation to report on science education in the country. And we have brought into being a research management advisory panel consisting of highly talented and experienced managers, to help establish useful ground rules which will give us better techniques of choice of programs and for good research management in general, especially in the very costly area of development.

Two problems which have emerged frequently in the discussions which my subcommittee has held have been selected to be the subject of further inquiry next month as another step ahead in our subcommittee's activities. One is the problem of geographical distribution of Federal funds allocated toward the conduct of research and development by grant and by contract. Various actions in other committees of the House have tended to point up this question. It was mentioned with frequency in our hearings. And it was only natural that when Boston was chosen as the site for the Electronics Research Center, the air was blue. But it is much more than local pride that stirred members from other areas—and the thoughts they aroused still hang in the air and need to be analyzed and brought to earth. In part there is the question of whether we are making full use of all the talent across the Nation. Until this question is satisfactorily answered, we cannot be sure that we are making the best use of all our national resources. This is a vitally important issue to our future and deserves serious thought.

For many years, there has been a systematic effort among our geographical regions to encourage greater dissemination of research and educational support to other States. Today, with 100 institutions receiving 9 of every $10 in Federal research funds, and 10 major universities—2 in New England and 2 in California included—receiving 40 percent of the total funds, there is increasing pressure to reexamine this distribution.

This question is more intense than it appears on the surface. The competition for activity, for research, for leadership, and almost inevitably new jobs reaches to the heart of a region's health and well-being. The competition and the battles that can result could be divisive in themselves. The strength of this feeling must not be underestimated.

The second area which the subcommittee proposes to look into is the indirect costs which are, or should be, allowed in connection with Government grants in the field of basic research.

Dr. Nathan Pusey, when he testified before our subcommittee, described this issue as the most serious immediate problem in the universities' relationship with the Government. He reported that it cost Harvard University in 1961–62—the last year for which an approved negotiated rate could be cited—some $668,000 to carry on project research work for the Government.

Perhaps this is somewhat technical, or at least is shorthand for a problem with which we are not all so familiar. The universities are, of course, one of the strongest areas for the conduct of basic research that we have in the United States. This basic research serves many purposes—it produces new information, answers questions that have been raised by the earlier determinations, and assists in an important way the training and education of new men and women in the scientific disciplines. When a university undertakes to carry on a specific project for the Government—or asks to do so, as our system usually requires—it contemplates that the work will be done with its facilities and by some of the great human resources and talent which exist there.

Now this poses a certain conflict of interest within the universities themselves. This, too, bothers a great many educators. To what purpose does a Federal project, admittedly intended to move us close to the establishment of national goals, fulfill the fundamental obligation of the university to teach and lead? Does the immense amount of Federal support of such research, which has grown remarkably in the past decade, tend to warp the university's basic mission? At the same time, the Government and the Congress place certain limitations upon the work, intended to encourage economy and efficiency. What happens when the university, from its scarce scholarship funds, finds itself obliged to divert money to keep laboratory lights burning to help a scientist do Federal work? I have simplified the problem, but I can assure you that any university administrator will be glad to pour forth his woes to you about this drain on university funds to meet indirect costs of research. I know from personal experience—and I agree with them that a better solution is needed, and we hope to help in achieving it.

The National Academy of Sciences, through its Committee on Science and Public Policy, headed by Dr. George B. Kistiakowsky of Harvard, recently filed a report on Federal support of basic research in institutions of higher learning. It has devoted considerable thought to these matters and it has contributed intelligent and constructive suggestions to this area of the Government-science relationship. Again, like Dr. Pusey, the committee concludes that this is one of the most serious fiscal problems to develop in the operation of the project system. And it ably highlights one of the misty areas when it notes that the difficulty of describing indirect costs in accounting terms is precisely what makes these costs indirect.

The Congress has dealt with this problem piecemeal, to this moment, as it has arisen in relation to the research budgets of the varying departments. Thus it has fallen to several committees and subcommittees to make their own determinations. The Appropriations Committee, which I can assure you is always suspicious of anything that looks like an unauditable expense, has devised several formulas, usually expressed in maximum limitations. In the executive branch, where these programs must be administered, the Bureau of the Budget has conducted some detailed studies and approved a circular which is generally agreed to be a fair approach.

Nevertheless, the problem increases in dimension. By statute, varying formulas are being applied. But many universities keep a complete record of their expenditures and find that they far exceed the authorized reimbursement. Indirect costs are incurred for common or joint objectives and are not readily subject to treatment. However, in auditing, wide ranges may develop between universities, and the Congress then tends to approve maximum limitations—such as the 20 percent limit which the House voted recently on research in health areas.

I have sought to indicate that this is a thorny area. Our subcommittee is now preparing to move into the bramblebushes. Some years ago, dealing with the space budget alone, I worked with a subcommittee which went into this problem, and I do not underestimate the difficulties of finding an agreeable solution, one that will provide for research, meet the needs of our educational institutions, and be acceptable to Congress. Our hearings on these two problems are expected to start on May 5, and we will explore first the views of the Federal agencies on these matters.

The program for this conference will give you a great deal of information concerning the promise and prospects for peaceful uses of space. The impact of the Space Age will, of course, continue to be great upon our industry, our economy, our labor force. It is already placing new demands upon education, upon medicine, and upon industrial skills in metallurgy and other technologies.

New England has a great deal to offer in support of this national obligation. I would cite first our great universities, and the fine young men and women whom they send into the world to be leaders in our Nation.

The leadership demonstrated by our universities—Yale, Harvard, Massachusetts Institute of Technology, Wesleyan, Williams, and Amherst, to mention only a few—will be an integral factor in the region's future. MIT's current plans for five new interdisciplinary research centers in the earth sciences, materials, life sciences, communications, and space sciences are extremely interesting and encouraging, and relate directly to the remarks earlier about lagging academic organization. Even before we determine the success of this program we can cite it as direct evidence of university leadership.

I would also cite the traditions and the resources which we have to commit. The Federal Reserve Bank of Boston pointed out in 1959 that in just 5 years of that decade, 85 percent of the total employment gains in expanding New England industries was traceable to six industries that had allocated the largest amounts to research and development. It prophesied that the contributions of research to new employment are bound to secure wider recognition.

In part, this view has been somewhat tempered by time. Research alone does not guarantee the future. There are concurrent problems of information exchange and transfer to product lines. The increasing pace of technology has also been accompanied—perhaps inevitably—by an increasing rate of obsolescence. This basic fact places sober and serious responsibilities on management, and upon the scientists and engineers themselves, to be aware of the rapidly changing frontiers of the state of the art, and to be adaptable to change readily to seize and exploit the new opportunities.

The steps which New England has already taken to assert its leadership in the new technology have stimulated this area's growth and strengthened its

leadership. This is perhaps the greatest reason why so many other areas are anxious to challenge New England for greater participation. Growth, research, and discovery breed further growth.

You have been given some idea of the country's estimate of what the space program alone means to New England and to the country. The other fields which apply to our national goals are also of critical importance. This is a world in which questions which are discussed on Beacon Hill or in Hyde Park may also have tremendous implications to San Francisco or to Paris or Saigon. The pace of change, which has meant much in our lifetime, will mean even more to the generations ahead.

A great many complex and difficult policy decisions, which will affect our future, lie within the responsibility of Congress. This is not unusual; the Congress deals every day with issues that are so intricate they do not receive the full attention of the press or the public. The Congress deals with them in a process which seeks fair and balanced judgments. It is in this spirit that it deals with science and technology.

We are in the midst of a technological revolution, and as in any revolution, the future is uncertain. Perhaps the minimum for which to hope is the reply of the distinguished aristocrat who, when asked what he had done during the French Revolution, answered: "I survived." But there are also the simple facts which can be derived from the expansion of scientific and technological knowledge, considered by many to be the most important element in economic growth. In my discussion of the question of geographical distribution, I have suggested the intense competition for funds and for growth which can be expected from all parts of the country.

The Congress is determined to draw together all the resources of the country, to allocate their use wisely, and to seek the accomplishment, at the earliest moment, of our national goals.